



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Kenneth E. Welker *et al.*

Serial No.: 10/597,227

Filed: July 17, 2006

For: Seismic Cable Positioning Using Coupled
Inertial System Units

Group Art Unit: 3663

Confirmation No.: 7982

Examiner: Krystine E. Breier

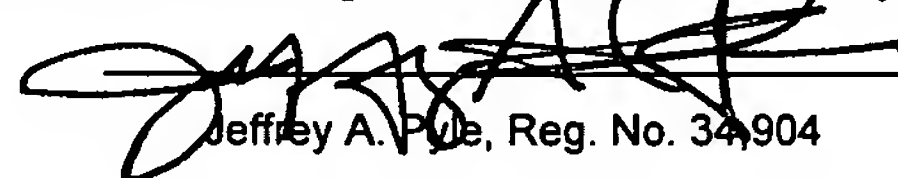
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REPLY BRIEF

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Jeffrey A. Pyle, Reg. No. 34,904

Sir:

Applicants hereby submit this "Reply Brief" in response to the "Examiner's Answer" dated November 29, 2010, and is due January 29, 2011. This "Reply Brief" is therefore timely filed. It is believed that no fee is due. However, should any fees under 37 C.F.R. §§1.16 to 1.21 be required for any reason, the Commissioner is authorized to deduct said fees from WesternGeco Deposit Account No. 501720.

I. STATUS OF THE CLAIMS

Claims 1-69 are pending in the case and were rejected as follows:

- claims 1-5, 7-8, 10-19, 21-30, and 32-69 as obvious under 35 U.S.C. 103(a) over U.S. Letters Patent 5,640,325 ("Banbrook *et al.*") in view of U.S. Letters Patent 6,625,083 ("Vandenbroucke");
- claim 6 as obvious under 35 U.S.C. 103(a) over Banbrook *et al.* and Vandenbroucke in combination with U.S. Letters Patent 6,011,752 ("Ambs"); and
- claims 9, 20, and 31 as obvious under 35 U.S.C. 103(a) over Banbrook *et al.* and Vandenbroucke in view of U.S. Letters Patent 5,739,787 ("Burke *et al.*").

Applicants appeal from each of these rejections.

II. REPLY TO THE OFFICE'S RESPONSE

Applicants previously argued that the Office erred in rejecting the claims as obvious over Banbrook *et al.* and Vandenbroucke because:

- the Office misconstrues Banbrook *et al.*;
- the art of record fails to teach or suggest all the limitations of the claims;
- Banbrook *et al.* is outside the scope and content of the prior art;
- Banbrook *et al.* and Vandenbroucke are improperly combined; and
- There is no reasonable expectation of success in the asserted combination of Banbrook *et al.* and Vandenbroucke.

The Office appears to have slightly misunderstood Applicants' position. To help dispel this, Applicants do not address each of the responses in turn. Applicants have, herein, variously combine these points to present their position from a slightly different perspective.

1. Banbrook *et al.*, When Properly Construed, Omits Claim Limitations

The actual limitation at issue is "an inertial measurement unit coupled to the seismic survey object", or some reasonable variation thereon. The Office cites Banbrook *et al.* for teaching this limitation. This is incorrect. A person ordinarily skilled in the art, considering the reference as a whole, would construe Banbrook *et al.* as teaching a passive, towed array SONAR system for use in underwater warfare rather than a seismic survey spread. Banbrook *et al.*, when construed as by one ordinarily skilled in the art, therefore could not teach the subject limitation. There are several factors that would dictate this construction, including the facts that:

- the word "seismic" never appears in Banbrook *et al.*; and
- Banbrook *et al.* teaches the use of a manned submarine of the type used in underwater warfare but not in seismic surveying.

Both of these points were previously raised.

Since the Office continues to contest this conclusion, Applicants further point to the references cited against Banbrook *et al.* The patent art cited by the Office is indifferent to this point. However, the non-patent art clearly supports Applicants' position to the detriment of the Office's. That non-patent art includes:

- Orr Kelly, "Sub Duels Under Polar Ice": How Ready Is U.S.?, U.S. News & World Report, Mar. 5, 1984, p. 35;
- Marc E. Liebman, "Towed Array Sonar", DS&E, Dec. 1986, p. 13; and

Tim Carrington, "Undersea Arms Race Is Preoccupying Navies Of U.S., Soviet Union", The Wall Street Journal, Jun. 24, 1987.

Each of these references clearly applies to passive, towed array SONARs for use in underwater warfare.

The Office begins its response with the following observation:

Appellant argues that Banbrook does not teach "an apparatus for use in a marine seismic survey" and "seismic survey object" since the word "seismic" does not appear in Banbrook.

("Examiner's Answer", p. 23) However, the Office provides no response to this observation. The Office therefore leaves Applicants' assertion unchallenged, thereby effectively conceding it.

The Office continues:

Appellant first argues that Banbrook does not teach a seismic survey because it teaches using a submarine to tow the array. However, this argument is not valid for two reasons. First, Banbrook teaches towing the array with "a surface ship or a submarine". As shown in the Appellants own drawings (see Figs 1, 2, 4, 6, and 7), towing a seismic survey with a surface ship is known. Secondly, although it is less common, it is also known to use submarines in seismic surveying (see Svenning (5747754)).

(*Id.*) There are at least two errors in logic here.

First, since passive, towed array SONARs used in underwater warfare are also towed behind surface vessels, this observation does not advance the Office's position. The Office is still ignoring that Banbrook et al. teaches towing the array behind a manned submarine. That is, the Office is seizing upon that teaching which it perceives as establishing its position while completing ignoring the teaching that undercuts it. This is improper. "It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art." M.P.E.P. §2141.02 VI; *In re Fritch*, 23 U.S.P.Q.2d (BNA) 1780, 1782 (Fed. Cir. 1992). In determining patentability, one simply cannot ignore parts of references. *Fritch*, 23 U.S.P.Q.2d (BNA) at 1782. That Banbrook et al. teaches the use of a surface vessel perfectly accords with Applicants' construction (as well as the Office's) while the use of a manned submarine completely undermines that of the Office.

Second, Svenning does not teach the use of a "submarine", but rather a "submarine vessel". The difference is important because, while all "submarines" are "submarine vessels", not all "submarine vessels" are "submarines". There is no indication in Svenning that the "submarine vessel" is in fact a manned "submarine", and so one skilled in the art would resort to the commonly understood practice in the art—*i.e.*, the use of remotely operated vehicles

(“ROVs”). ROVs, too, are “submarine vessels” but are not “submarines” and are not referred to as such by those in the art.

The Office then once again continues:

Appellant next argues that Banbrook does not teach a seismic survey because it teaches a SONAR system. This is not a valid argument. Sonar and seismic devices/methods are classified in the same class and are very similar to each other. Both use the same types of acoustic transducers to emit acoustic signals into the desired medium, and receive acoustic reflections using the same types of acoustic receivers. Similar types of data analysis are performed on the data in both cases. The only difference between seismic and SONAR is the type of objects or interfaces that the survey is designed to detect. Banbrook teaches using reflected acoustic signals detected at acoustic sensors to determine the position of a target, which may be a subsurface reservoir. This is the method and goal for a seismic survey.

(*Id.*, pp. 23-24) There are also several errors here.

The issue at hand is whether Banbrook et al. teaches “an apparatus for use in a marine seismic survey” or “a seismic survey object”. To argue that Banbrook et al. does not teach such a limitation because it teaches something else—namely, a passive, towed array seismic survey—is therefore certainly *valid*. That the Office disagrees with it, or accords it little weight does not make it invalid.

That the Office classifies seismic surveying and SONAR together for purposes of examination does not make them the same thing. Nor does it even mean that they are relevant in all their aspects. Indeed, as set forth immediately below and contrary to the Office’s assertion, there are significant differences between seismic surveying and SONAR.

The Office is completely wrong when it asserts that

Both use the same types of acoustic transducers to emit acoustic signals into the desired medium, and receive acoustic reflections using the same types of acoustic receivers. Similar types of data analysis are performed on the data in both cases. The only difference between seismic and SONAR is the type of objects or interfaces that the survey is designed to detect.

(*Id.*) There are several fundamental differences that refute this, including:

- passive SONAR systems do not use a source of any kind and so do not ever “emit acoustic signals” into any kind of medium;
- SONAR investigates the *content* of the *water column* whereas seismic prospecting is indifferent to the content of the water column because it determines the *characteristics* of *subterranean geological formations*;
- because of the different media, SONAR and seismic surveying operate on very different frequencies of acoustic energy;

- acoustic signals may comprise both pressure wave sensors, but SONAR only uses pressure sensors because shear waves do not propagate in water whereas land-based and seabed surveys use not only pressure wave sensors but also shear wave sensors;
- SONAR only determines range through the water but seismic surveying determines characteristics of the geological formation from the reflections;
- many types of data processing used in seismic surveying are performed because of physical phenomena not found in SONAR; and
- many techniques for generating signals in seismic surveys have no counterpart in SONAR.

Thus, there are many differences between SONAR and seismic surveying in addition to the type of objects and interfaces they “detect”.

These differences in the practical considerations in structure and operation furthermore establish that Banbrook *et al.* is outside the scope and content of the prior art. *In re Clay*, 23 U.S.P.Q.2d (BNA) 1058, 1060-61 (Fed. Cir. 1992); *In re Horn*, 203 U.S.P.Q. (BNA) 969, 971 (C.C.P.A. 1979). Like the case in *In re Pagliero*, 210 U.S.P.Q. (BNA) 888 (CCPA 1981), the Office is improperly focusing on a single commonality rather than looking at the reference as a whole. As Applicants earlier asserted:

When both Banbrook *et al.* and the claims are considered as a whole, rather than for their one commonality, it is evident that Banbrook *et al.* is from a non-analogous art. It is evident that the present claims recite a position determining technique for use in a marine seismic survey. Banbrook *et al.* plainly teaches a technique for determining position on a cable in a SONAR array. The differences between the SONAR application and the marine seismic survey far outweigh the one similarity on which the Office has focused in terms of whether one skilled in the art addressing the problem confronting the inventors would look to Banbrook *et al.* for help. Since Banbrook *et al.* is directed to a different purpose than the claimed invention, one of ordinary skill in the art “would accordingly have had less motivation or occasion to consider it”. *Clay*, 23 U.S.P.Q.2d (BNA) 1061. Banbrook *et al.* is therefore outside the scope and content of the prior art. *Clay*, 23 U.S.P.Q.2d (BNA) at 1060; *Pagliero*, 210 U.S.P.Q. (BNA) at 888-890.

(“Appeal Brief”, pp. 16-17)

The entire discussion, however, assumes that Banbrook *et al.* teaches a SONAR technique. This is true even on the Office’s end of the discussion. If that is true, then it is

egregiously incorrect to state that Banbrook et al. could be used to “determine the position of a target, which may be a subsurface reservoir.” SONAR uses a frequency that is fundamentally unsuitable for investigating subsurface geological formations because they are physically different from the water column. It also does not collect the kind or quantity of data needed to locate a subsurface geological formation. The Office’s assertion that SONAR and seismic surveying are essentially the same thing is therefore incorrect.

The Office concludes:

Appellant further argues that Banbrook teaches a passive array. None of the independent claims require the use of a seismic source, nor do they make any mention of an active array. Limitations that are not part of the claim cannot be considered in the examination. With respect to the dependent claims which do require the presence of a seismic source, the Examiner will point out that this deficiency is supplied by Vandembroucke. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Banbrook with the sources taught by Vandembroucke since such a modification would have given more flexibility in the abilities of the surveying apparatus to survey over more varied, noisier, or more geographically complex environments.

(*Id.*, p. 24) Among the errors here are:

- Applicants do not argue that the claims recite seismic sources, although the recitation of “seismic survey” necessarily implies an active system since seismic surveying involves imparting an acoustic signal into the formation (this act is what makes it active);
- thus, this is one distinguishing feature between “seismic surveying” and a passive, towed array SONAR application;
- while Vandembroucke teaches, or at least suggests, active sources, this is immaterial to whether Banbrook et al. teaches an active system or a seismic surveying system.

The Office’s position is that *Banbrook et al.* teaches this limitation, not Vandembroucke. The teachings of Vandembroucke do not remedy this error in the Office’s analysis. The Office has misconstrued Banbrook et al.

Furthermore, the significance of Banbrook et al. failing to teach anything regarding a seismic survey is that it therefore cannot teach “an inertial measurement unit coupled to the seismic survey object” as alleged by the Office. Vandembroucke cannot help in this respect because it teaches nothing regarding the use of IMUs in its seismic survey spread. Thus, in combination, Banbrook et al. and Vandembroucke do not teach all the limitations of the claims.

2. The Asserted Combination is Error

The Office appears to recognize that Banbrook et al. and Vandembroucke, in combination, fail to teach the subject limitation because it now asserts some modification of the various teachings:

Appellant further argues that Banbrook teaches a passive array. None of the independent claims require the use of a seismic source, nor do they make any mention of an active array. Limitations that are not part of the claim cannot be considered in the examination. *With respect to the dependent claims which do require the presence of a seismic source, the Examiner will point out that this deficiency is supplied by Vandembroucke. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Banbrook with the sources taught by Vandembroucke since such a modification would have given more flexibility in the abilities of the surveying apparatus to survey over more varied, noisier, or more geographically complex environments.*

(*Id.*, p. 24, emphasis added)

However, the asserted reason for modifying Banbrook et al. with Vandembroucke's teachings of seismic sources makes no sense from the perspective of one skilled in the art. Passive SONAR systems are designed to be passive because active sources can be detected by enemy units—modifying a passive SONAR system to include an active source would therefore defeat one of its primary objectives in remaining undetected. This means that the proposed modification is impermissible and is a form of teaching away that establishes *prima facie* that the claims are unobvious. Furthermore, there is no evidence or reasoning of record that would support the notion that such a modification “would have given more flexibility in the abilities of the surveying apparatus to survey over more varied, noisier, or more geographically complex environments.” This assertion is completely unsupported on the present record.

The Office for the first time attempts to set a high level of ordinary skill in an attempt to boost the verity of its position. (“Examiner’s Answer”, p. 26) Applicants neither contest nor acquiesce in the Office’s determination of the level of skill because it is irrelevant. No matter the level of ordinary skill in the art, it cannot overcome the fact that the asserted modifications in the course of the combination would defeat one of its primary purposes. Nor would it overcome the fact that Banbrook et al. is outside the scope and content of the prior art.

The Office also argues that the combination is justifiable because SONAR is supposedly functionally equivalent to seismic surveying and because the combination would allegedly yield an improved positioning system where accurate positioning is highly prized. (“Examiner’s Answer”, pp. 26-27) The “reasonable expectation of success” is said to arise from similar

considerations. (*Id.*, at p. 27) A technology that locates the position of an object in the water column is not “functionally equivalent” to one that acquires information regarding a subterranean geological formation for the reasons set forth above. As to the allegedly improved positioning system,

The art of record must establish a reasonable probability of success arising therefrom. M.P.E.P. §2143.02; *In re Naylor*, 152 U.S.P.Q. (BNA) 106, 108 (C.C.P.A. 1966); *In re Rinehart*, 189 U.S.P.Q. (BNA) 143, 148 (C.C.P.A. 1976). Both Banbrook *et al.* and Vandenbrouke [*sic*] already affirmatively state that their respective technique provide position determination and represents their technique as complete. Neither Banbrook *et al.* nor Vandenbrouke suggests any deficiencies that might be cured by combining their technique with another. Thus, even ignoring the other deficiencies in the *prima facie* case, the only thing that one skilled in the art would expect from combining the two techniques is an unnecessary and undesirably complex, expensive, duplication of effort. This is not a “reasonable expectation of success”, and so the combination fails to render obvious any claim.

(“Appeal Brief”, p. 18, emphasis added) The only evidence of record supporting this proposition is found in Applicants’ disclosure, which evidences the improper exercise of hindsight. *In re Oetiker*, 24 U.S.P.Q.2d (BNA) 1443 (Fed. Cir. 1992).

But, beyond these deficiencies, Banbrook *et al.* is outside the scope and content of the prior art. It is therefore not properly combinable with references within scope and content of the prior art. And regardless of whether it is actually outside the scope and content of the prior art, it is clearly directed to a different purpose than the claimed invention, one of ordinary skill in the art “would accordingly have had less motivation or occasion to consider it”. *In re Clay*, 23 U.S.P.Q.2d (BNA) 1058, 1061 (Fed. Cir. 1992).

3. Conclusion

The Office’s response to Applicants’ argument impliedly concedes that Banbrook *et al.* in fact teaches a SONAR application rather than a seismic survey. This impliedly admits that Banbrook *et al.* fails to teach “an inertial measurement unit coupled to the seismic survey object”, or some reasonable variation thereon. Even aside from the implied concession, this is the proper construction of Banbrook *et al.* Thus, the claims are unobvious because the art in combination does not teach all the limitations of the claims. M.P.E.P. §706.02(j); *In re Royka*, 180 U.S.P.Q. (BNA) 580 (CCPA 1974).

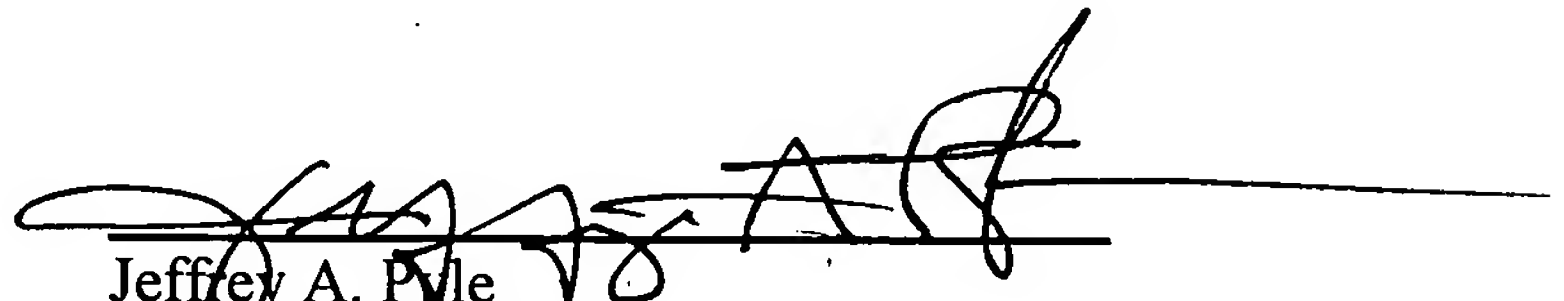
Once the technical errors are eliminated from the Office's response, it focuses on the one, single point of commonality between the SONAR and seismic surveying—the detection of acoustic waves. This focus repeats the error of *In re Pagliero*, 210 U.S.P.Q. (BNA) 888 (CCPA 1981). The differences are, however, much greater and much more significant as is established above. As evidenced by these differences in structure and operation, Banbrook et al. is not a reference to which one skilled in the art confronting Applicants problem would turn. *In re Clay*, 23 U.S.P.Q.2d (BNA) 1058, 1060-61 (Fed. Cir. 1992); *In re Horn*, 203 U.S.P.Q. (BNA) 969, 971 (C.C.P.A. 1979).

In view of the foregoing, it is respectfully submitted that the Examiner erred in not allowing claims 1-69 over the prior art of record. Applicants therefore pray that that the rejections be REVERSED and the claims allowed to issue. The undersigned may be contacted at (832) 431-4058 with respect to any questions, comments or suggestions relating to this appeal.

Respectfully submitted,

Date: January 28, 2011

Lee, Jorgensen, Pyle & Kewalramani, PC
1800 Augusta, Suite 250
Houston, Texas 77057
(832) 431-4058 ph
(713) 659-0588 fax


Jeffrey A. Pyle
Reg. No. 34,904
Attorney for Applicants